



***Federal Railroad Administration
Office of Railroad Safety
Accident and Analysis Branch***

***Accident Investigation Report
HQ-2014-3***

***CSX Transportation (CSX)
Cordesville, SC
April 28, 2014***

Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.

TRAIN SUMMARY

1. Name of Railroad Operating Train #1 CSX Transportation	1a. Alphabetic Code CSX	1b. Railroad Accident/Incident No. 000129212
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GENERAL INFORMATION

1. Name of Railroad or Other Entity Responsible for Track Maintenance CSX Transportation	1a. Alphabetic Code CSX	1b. Railroad Accident/Incident No. 000129212
2. U.S. DOT Grade Crossing Identification Number	3. Date of Accident/Incident 4/28/2014	4. Time of Accident/Incident 7:08 AM
5. Type of Accident/Incident Derailment		
6. Cars Carrying HAZMAT 7	7. HAZMAT Cars Damaged/Derailed 0	8. Cars Releasing HAZMAT 0
	9. People Evacuated 0	10. Subdivision Andrews
11. Nearest City/Town Cordesville	12. Milepost (<i>to nearest tenth</i>) SH403.1	13. State Abbr. SC
	14. County BERKELEY	
15. Temperature (F) 78 °F	16. Visibility Dusk	17. Weather Clear
	18. Type of Track Main	
19. Track Name/Number Single Main	20. FRA Track Class Freight Trains-40, Passenger Trains-60	21. Annual Track Density (<i>gross tons in millions</i>) 9.1
	22. Time Table Direction North	

FRA FACTUAL RAILROAD ACCIDENT REPORT

OPERATING TRAIN #1

1. Type of Equipment Consist: Freight Train				2. Was Equipment Attended? Yes		3. Train Number/Symbol F74628									
4. Speed (recorded speed, if available) R - Recorded E - Estimated		Code R	5. Trailing Tons (gross excluding power units) 3204		6a. Remotely Controlled Locomotive? 0 = Not a remotely controlled operation 1 = Remote control portable transmitter 2 = Remote control tower operation 3 = Remote control portable transmitter - more than one remote control transmitter			Code 0							
6. Type of Territory Signalization: <u>Not Signaled</u> Method of Operation/Authority for Movement: <u>Direct Train Control</u> Supplemental/Adjunct Codes: <u>P</u>															
7. Principal Car/Unit		a. Initial and Number	b. Position in Train	c. Loaded (yes/no)	8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box.		Alcohol	Drugs							
(1) First Involved <i>(derailed, struck, etc.)</i>		BPRX 6266	27	no			0	0							
(2) Causing <i>(if mechanical, cause reported)</i>		BPRX 6266	27	no	9. Was this consist transporting passengers?		No								
10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)		a. Head End	Mid Train		Rear End		11. Cars (Include EMU, DMU, and Cab Car Locomotives.)		Loaded		Empty		e. Caboose		
			b. Manual	c. Remote	d. Manual	e. Remote	a. Freight	b. Pass.	c. Freight	d. Pass.					
(1) Total in Train		2	0	0	0	0	(1) Total in Equipment Consist	8	0	64	0	0			
(2) Total Derailed		0	0	0	0	0	(2) Total Derailed	0	0	4	0	0			
12. Equipment Damage This Consist 119943			13. Track, Signal, Way & Structure Damage 1000												
14. Primary Cause Code M507 - Investigation complete, cause could not be determined (When using this code, the narrative must include the reason(s) why the cause of the accident/incident could not be determined)															
15. Contributing Cause Code M507 - Investigation complete, cause could not be determined (When using this code, the narrative must include the reason(s) why the cause of the accident/incident could not be determined)															
Number of Crew Members				Length of Time on Duty											
16. Engineers/Operators		17. Firemen		18. Conductors		19. Brakemen		20. Engineer/Operator				21. Conductor			
1		0		1		0		Hrs: 2 Mins: 8		Hrs: 2 Mins: 8					
Casualties to:		22. Railroad Employees		23. Train Passengers		24. Others		25. EOT Device?				26. Was EOT Device Properly Armed?			
Fatal		0		0		0		Yes				Yes			
Nonfatal		0		0		0		27. Caboose Occupied by Crew?				N/A			
28. Latitude 33.064540000				29. Longitude -79.975506000											

CROSSING INFORMATION

Highway User Involved				Rail Equipment Involved			
1. Type				5. Equipment			
2. Vehicle Speed (<i>est. mph at impact</i>)		3. Direction (<i>geographical</i>)		6. Position of Car Unit in Train			
4. Position of Involved Highway User				7. Circumstance			
8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials? N/A				8b. Was there a hazardous materials release by N/A			
8c. State here the name and quantity of the hazardous material released, if any.							
9. Type of Crossing Warning 1. Gates 4. Wig wags 7. Crossbucks 10. Flagged by crew 2. Cantilever FLS 5. Hwy. traffic signals 8. Stop signs 11. Other (<i>spec. in narr.</i>) 3. Standard FLS 6. Audible 9. Watchman 12. None N/A				10. Signaled Crossing Warning		11. Roadway Conditions N/A	
12. Location of Warning N/A			13. Crossing Warning Interconnected with Highway Signals N/A			14. Crossing Illuminated by Street Lights or Special Lights N/A	
15. Highway User's Age		16. Highway User's Gender	17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train			18. Highway User	
19. Driver Passed Standing Highway Vehicle			20. View of Track Obscured by (<i>primary obstruction</i>)				
Casualties to:		Killed	Injured	21. Driver was		22. Was Driver in the Vehicle?	
23. Highway-Rail Crossing Users		0	0	24. Highway Vehicle Property Damage (<i>est. dollar damage</i>)		25. Total Number of Vehicle Occupants (<i>including driver</i>)	
26. Locomotive Auxiliary Lights? N/A				27. Locomotive Auxiliary Lights Operational? N/A			
28. Locomotive Headlight Illuminated? N/A				29. Locomotive Audible Warning Sounded? N/A			

10. Signaled Crossing Warning

- 1 - Provided minimum 20-second warning
- 2 - Alleged warning time greater than 60 seconds
- 3 - Alleged warning time less than 20 seconds
- 4 - Alleged no warning
- 5 - Confirmed warning time greater than 60 seconds
- 6 - Confirmed warning time less than 20 seconds
- 7 - Confirmed no warning
- N/A - N/A

Explanation Code

- A - Insulated rail vehicle
- B - Storm/lightning damage
- C - Vandalism
- D - No power/batteries dead
- E - Devices down for repair
- F - Devices out of service
- G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present
- H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)
- J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits
- K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/island circuit
- L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction
- M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed
- N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach
- O - Warning time less than 20 seconds attributed to violation of special train operating instructions
- P - No warning attributed to signal systems failure to detect the train
- R - Other cause(s). Explain in Narrative Description

SYNOPSIS

On April 28, 2014, at 7:08 p.m., EDT, northbound CSX Transportation (CSX) Freight Train F74628, traveling on single main track, in track warrant control territory, derailed. The derailment occurred near Cordesville, South Carolina, at CSX Milepost SH 403.1, on CSX's Andrews Subdivision. A single derailed car traveled 2 miles to a turnout where three more cars derailed, overturning three cars, and causing a section of road to collapse onto the train. There were no injuries. There was no release of hazardous materials and this is not an Amtrak Route. Reported track damage was \$1,000 and equipment damage was \$119,943.

At the time of the accident, it was clear at dusk and the temperature was 78 degrees F.

Probable cause of derailment is M507 "Cause could not be determined."

NARRATIVE

On April 28, 2014, at 7:08 p.m., EDT, northbound CSX Transportation (CSX) Freight Train F74628, traveling on single main track, in track warrant control territory, derailed. The derailment occurred near Cordesville, South Carolina, at CSX Milepost SH 403.1, on CSX's Andrews Subdivision. A single derailed car traveled 2 miles to a turnout where three more cars derailed, overturning three cars, and causing a section of road to collapse onto the train.

CIRCUMSTANCES PRIOR TO THE ACCIDENT:

The crew of Train F746-28 North included a locomotive engineer and a conductor. They reported for duty at 5:00 p.m., EDT, April 28, 2014, at CSX's Bennett Yard in North Charleston, South Carolina, which was the home terminal for both crew members. Both received more than the statutory off-duty period prior to reporting for duty.

Their assigned freight train consisted of 2 locomotives and 72 cars; (64 empty and 8 loaded). The eight loaded cars were in positions 2, 3, 5-7, and 22-24. It was 4,301 feet long and weighed 3,204 tons. The train was scheduled to travel to Andrews, South Carolina.

The train had received the required Class 1 brake test prior to the crew's arrival with the brake slip on the lead locomotive. The train departed Bennett Yard after the crew contacted the FE dispatcher for an EC-1 authority to proceed to Andrews.

As the train approached the accident area, the Locomotive Engineer was seated at the controls on the east side of the leading locomotive and the conductor was seated on the west side.

This is single main track and track warrant movement authority (Form EC-1) as indicated by railroad timetable. The railroad timetable direction of the train was north. The geographic direction was northeast. Timetable directions are used throughout this report. Timetable maximum authorized speed is 40 mph in the area of the initial point of derailment and bridge.

THE ACCIDENT:

Train F746-28 reduced speed for a 25 mph speed restriction (Milepost SH 403.1 to SH 403.0)). The train was traversing this slow order when car 27 (BPRX 6266) derailed at MP SH 403.1 and continued north for 2 miles before encountering the turnout at MP SH401.2 (Middleton Spur). The derailed car then struck the Cypress Gardens Road highway overpass immediately north of the spur track. At this point, the train was starting to pull and the train experienced an undesired emergency brake application. The crew announced the emergency over the radio and began keying up the dispatcher. While the Conductor prepared to dismount the locomotive, the Engineer noted that air was not coming back up on the train. The Conductor walked back and found the derailment and damage to the bridge. He and the Engineer quickly worked with the FE dispatcher to alert the Chief Dispatcher, CSX Police, and emergency responders about the bridge collapse to protect the public.

THE INVESTIGATION:

The crewmembers stated that they did not feel or hear anything unusual prior to experiencing the undesired brake application. There was also no reported unusual conditions or occurrences reported prior to the undesired emergency and derailment.

Locomotive event recorder download indicates that Train F746-28 was operating at 28 mph, reducing to 23 mph within 320 feet for the speed restriction. The train was traveling at 24 mph when the principal car derailed. CSX computer re-enactment of the derailment using the locomotive event recorder, found that the crew was in compliance with Federal regulations and used proper train handling techniques.

The location where the derailment occurred was within a 25 mph slow order. On April 18, 2014, 10 days prior to the derailment, a CSX track inspector placed a 25 mph slow order on the track at MP 401.3 on the Andrews Subdivision. The slow order was placed because of a 1 5/8-inch track alignment. There was also a 1 5/8-inch warp (difference in cross level between any 2 points less than 62 feet apart). Maximum authorized speed at this location is 40 mph, which is Class 3 by the Federal Railroad Administration's (FRA) Track Safety Standards (TSS). FRA's TSS allows a 1 3/4-inch alignment deviation and a 2 1/4-inch deviation for warp condition on Class 3 track. Although this location was within the measurements provided by FRA's TSS, CSX's track inspector lowered the speed to 25 mph (FRA Class 2) as an extra measure of safety at this location. FRA's TSS allows a 3-inch alignment deviation and a 2 1/4-inch warp condition on Class 2 track. There was no record of "rough track" documented by trains going over this location at 40 mph prior to CSX track inspector placing this slow order on the track.

From April 18, when CSX's track inspector placed the slow order on the track until the derailment on April 28, thirty-one trains traversed over this main track at 25 mph. There were no "rough track" reports by train crews and none of the rail cars had issues traversing this location.

The principle car, BPRX 6266, a covered hopper, was Car 27 in Train F746-28. The locomotives and first 26 cars traversed the slow order at MP 401.3. However, the trailing trucks on the BPRX 6266 derailed and the 45 cars behind it did not derail at the slow order.

BPRX 6266 climbed the west rail and rode on top of the rail for 39 feet and 10 inches before derailing. After the car derailed it rode on the ties for approximately 2 miles before encountering the Middleton Spur turnout at MP SH 401.3. Hitting the spur dislodged the trucks. This caused Cars 28-30 to derail and turnover. The derailed cars struck the concrete and timber piles of the Cypress Gardens Road overpass at MP SH401.1. About a 20-foot section of the overpass road surface collapsed on top of the derailed cars.

ANALYSIS AND CONCLUSIONS:

Fatigue - Analysis

FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue analysis. At or above this baseline, FRA does not consider fatigue as probable for any employee. Software sleep settings vary according to information obtained from each employee. If an employee does not provide sleep information, FRA uses the default software settings.

FRA obtained fatigue-related information, including a 10-day work history, for the two employees involved in this accident. FRA concluded fatigue was not probable for the Engineer and Conductor assigned to this train.

1. Engineer of Train F746-28	
Sleep setting	Excellent
Overall effectiveness	88.08 %
Lapse Index	1.45
Reaction time	113.53
Chronic Sleep Debt	3.26
Hours of continuous wakefulness	0.00
Time of Day	07:08
BAC Equivalent	<0.05

Conclusion: Fatigue was not probable for this employee.

2. Conductor of Train F746-28	
Sleep setting	Excellent
Overall effectiveness	88.11 %
Lapse Index	1.43
Reaction time	113.49
Chronic Sleep Debt	3.24
Hours of continuous wakefulness	0.00

Hours of continuous wakefulness 0.00
Time of Day 07:08
BAC Equivalent <0.05

Conclusion: Fatigue was not probable for this employee.

Overall Conclusion of Fatigue Analysis:
Fatigue was not a contributing factor in this derailment.

Analysis-Locomotive Engineer Operating Performance:
The locomotive was equipped with a speed indicator and an event recorder. The relevant event recorder data was downloaded and analyzed.

Conclusion: The locomotive engineer was in compliance with all applicable railroad operating and train handling requirements.

Analysis-Track:
The section of CSX main track through the accident location has a maximum speed of 40 mph. The track is tangent with 0.0 percent grade, and consists of 115-pound jointed rail. The rail has a mill date of 1951, and was installed in 1951 by former Seaboard Coastline Railroad. The rail is seated in 12-inch double shoulder tie plates fastened by 7-inch track spikes to wooden mainline crosssties. A CSX tie renewal program worked through the area in February 2013.

The track through the derailment area was last inspected by a CSX track inspector on April 25, 2014, with no defects recorded. The last geometry car inspection was performed by CSX with Geometry Car GMS1 on November 13, 2013. No defects or exceptions were noted in the area where the accident occurred. The last search for internal rail defects was performed by Sperry Rail Services (SRS) on February 10, 2014, and no defects were found in the area. CSX track inspector lowered the speed on the track at MP 401.3 as an extra measure of safety. The track measurements were within allowable FRA standards for 40 mph and the inspector lowered the track to 25 mph as a precaution.

CSX lists "Track alignment irregular," as the probable cause when 1 5/8-inch is only slightly more than 50 percent of the allowable deviation (54 percent). CSX lists "Cross level of track irregular," as a contributing cause. The cross level measurement at the point of derailment was 7/8-inch. This is only 44 percent of the allowable cross level deviation allowed by FRA standards.

Conclusion-Track: The track within the "slow order" area met criteria in 49 CFR Part 213, Track Safety Standards. Track is not the probable cause of this derailment.

Analysis-Evaluation and Testing of Equipment Involved:
On August 13, 2014, CSX performed a post-accident equipment inspection report (TA-5) on covered hopper, BPRX 6266. This was the first car to derail. The TA-5 inspection was not completed properly. CSX brought covered hopper, BPRX 6266, in for inspection with the trucks that were previously under BPRX 201552. The TA-5 report states that the R3 wheels were the first to derail. These wheels inspected during the TA-5 were not under BPRX 6266 when it derailed. CSX did not furnish for inspection the truck that was present under BPRX 6266 when it derailed. At some point after the derailment, possibly during re-railing, the original "A" end trucks were not placed under BPRX 6266.

The local FRA mechanical inspector made an inspection of BPRX 6266 in September 2014, but the car still had wrong truck and wheels under it. There is no record of inspection for the actual trucks that were under BPRX 6266 when it derailed. However, according to car repair history, WILD wheel report, and the TBOGI (truck condition) report, there were no apparent defects that either caused or contributed to the derailment.

On September 4, 2014, the Region 3 MP&E Specialist and an MP&E Inspector were allowed by CSX to inspect what was supposedly the correct, "A" end trucks, from BPRX 6266. The truck was dismantled and in disarray inside a locked and fenced area. Due to positioning of the parts and the now age of marking, an adequate inspection could not be made. Of the parts that could be inspected, no conditions were noted other than what occurred in the derailment.

CSX has since scrapped car BPRX 6266. According to CSX reports, this car had minor damage and the TA-5 report showed it to be in good condition. This car was upright at the derailment and pictures show that there was minimal damage to the car.

Conclusion:
CSX did not produce, until September 2014, the actual truck and wheels that allegedly derailed first. At that point they were not under the car and were completely dismantled. Without a thorough and complete inspection of the trucks that were under this car during the derailment, there is no way to confirm or dismiss that this car was the probable or contributing cause.

Overall conclusions:
There were no exceptions to train operations. There is no evidence that any other train or rail cars having trouble traversing the track where the derailment occurred. The car suspected to have derailed first was not made available to FRA in its entirety, therefore FRA was unable to complete a thorough inspection of that car. Specifically, the truck including the first derailed wheel were not made available to FRA.

Probable Cause:
Probable cause of derailment is M507 "Cause could not be determined."